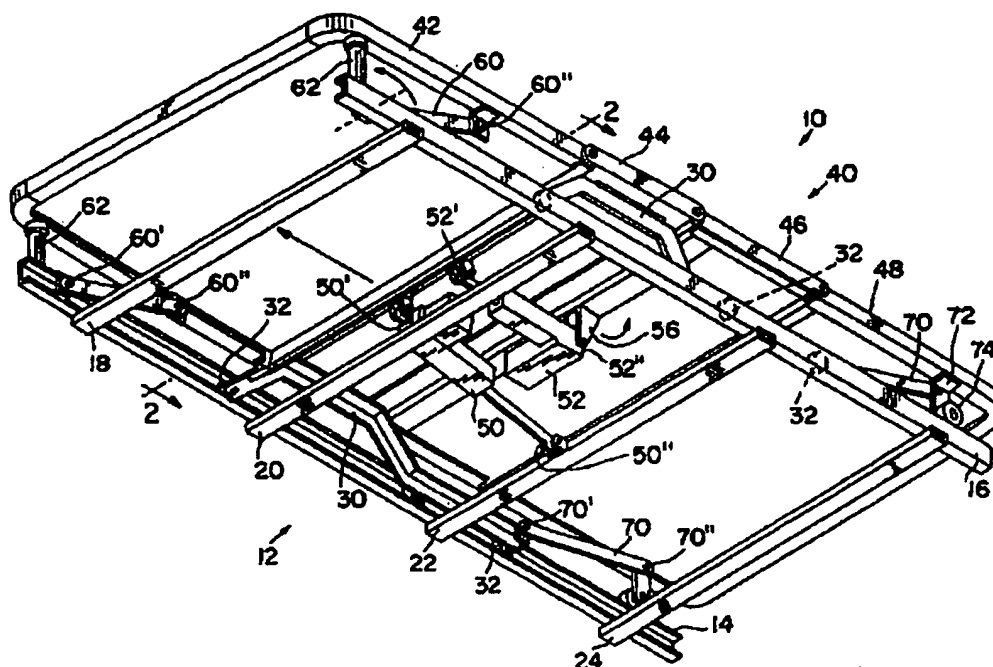
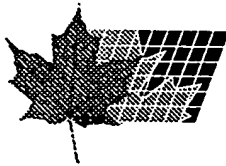


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(54) **CADRE DE LIT ARTICULE**
(54) **ARTICULATING BED FRAME**



(57) Le cadre (10) de lit comprend un cadre (12) de base et un cadre supérieur (40) articulé. Le cadre (12) de base comprend une extrémité tête, une extrémité pied et des côtés s'étendant longitudinalement qui sont situés des deux côtés opposés. Le cadre supérieur articulé (40) comprend une zone supérieure (42) pour le corps, une zone (44) pour les fesses, une zone (46) pour les cuisses et une zone (48) inférieure pour les mollets. Le cadre supérieur articulé (40) est monté sur le cadre (12) de base pour décaler longitudinalement le cadre supérieur articulé (40) par rapport au cadre (12) de base. Un premier ensemble (50) d'entraînement permettant de

(57) The bed frame (10) includes a base frame (12) and an articulating upper frame (40). The base frame (12) includes a head end, a foot end, and oppositely disposed, longitudinally extending sides. The articulating upper frame (40) comprises an upper body section (42), a seat section (44), a thigh section (46), and a lower leg section (48). The articulating upper frame (40) is mounted on the base frame (12) for longitudinal shifting of the articulating upper frame (40) relative to the base frame (12). A first drive assembly (50) for raising and lowering the upper body section (42) includes linkage connected to the upper body section (42) such that, tilting



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remonter et d'abaisser la zone (40) supérieure pour le corps comprend une articulation reliée à la zone (42) supérieure pour le corps de telle sorte que le mouvement de basculement de la zone (42) supérieure pour le corps décale longitudinalement le cadre (40) supérieur articulé par rapport au cadre (12) de base. Un deuxième ensemble (52) d'entraînement permettant de relever et de faire descendre la zone (46) pour les cuisses comprend une articulation reliée à la zone (48) inférieure pour les mollets de sorte que, lorsque la zone (46) pour les cuisses est basculée vers le haut, la zone (48) inférieure pour les mollets bascule vers le bas.

movement of the upper body section (42) shifts the articulating upper frame (40) longitudinally relative to the base frame (12). A second drive assembly (52) for raising and lowering the thigh section (46) includes linkage connected to the lower leg section (48) such that, when the thigh section (46) tilts upwardly, the lower leg section (48) tilts downwardly.

ARTICULATING BED FRAME

Background and Summary of the Invention

5 The present invention relates to articulating bed frames and more particularly to the provision of articulating bed frames which will move rectilinearly toward the wall or the stationary headboard when the upper body portion of the bed is tilted upwardly, move rectilinearly toward the foot of the bed when the upper body portion is tilted downwardly, and which can also be moved into a purchaser's home by one delivery person and assembled by that delivery person.

10 Articulating bed frames are known and are often referred to as "hospital bed" frames in that the frames provide relatively movable upper body portions, seat portions, thigh portions and lower leg portions. Such beds are described in PCT International Publication No. WO 97/19619 published 05 June 1997 (05.06.97). In such beds, the head and upper back of the person reclining on the bed may be tilted
15 upwardly from the transversely extending seat panel to a selected position. Generally the transversely extending seat panel remains stationary and flat. The thigh section tilts upwardly from the seat panel to raise the patient's knees and thighs. The lower leg panel then tilts downwardly from the thigh panel in conventional fashion.

It is desirable to have such an articulating frame which is shipped in semi-
20 knocked down (SKD) condition for ease of handling, transportation and assembly in the field. Only one delivery person is required to take such a SKD articulating frame to a customer's home to be installed. It is also desirable to have such an articulating frame which will move rectilinearly toward the head of the bed when the head portion is raised and toward the foot of the bed when the head portion is lowered. This will
25 permit the bed to be placed against a wall or a stationary headboard. It will also permit the person on the bed to stay close to the adjacent night stand when the head portion is tilted upwardly.

In accordance with the present invention, such an articulating frame can be set up on a conventional metal bed frame, inside a conventional water bed or inside a
30 conventional sleigh frame which includes fixed headboards and footboards with side rails therebetween. Such an articulating frame fits a marketing paradigm of providing an adjustable frame to go on a conventional bed frame to replace the conventional box

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spring. An embodiment of the present invention is established to fit on a variety of frames defined by industry standards. While it may be known to have such add-on frames, it is not known to provide such an add-on articulating frame which moves rectilinearly toward and away from the wall or the stationary headboard, which
5 includes removable panels in each of the support sections of the frame, and which is shipped in SKD form.

One embodiment of the invention, therefore, comprises a two-part articulating bed frame which will fit on a conventional bed frame, have articulating panel sections movable with respect to such conventional bed frames, and be delivered and installed
10 by one person. This embodiment includes a base frame which is a weldment that moves separately from the articulating upper frame and which includes, at each of its longitudinally extending sides, inwardly facing channels serving as guide tracks. The channels are connected by longitudinally spaced apart, transversely extending struts such that the assembly becomes rigid, but lightweight and easy to transport. The
15 inwardly facing channels serve as tracks or guides for rollers which accommodate the longitudinally directed, rectilinear movement of the upper frame.

Essentially, the upper frame is a hinged frame providing an upper body frame section, a seat frame section, a thigh frame section, and a lower leg frame section. These frame sections are longitudinally spaced apart and transversely extending in
20 conventional fashion. Adjacent frame sections may be hinged together to provide for articulating movement of at least the upper body, thigh and lower leg frame sections. The seat section is conventionally not an articulating section and stays flat or horizontal. It is on this seat section that the control for the drive mechanisms for the upper body frame section and thigh frame section may be provided. Typically these
25 drive mechanisms may be conventional electric motor and screw arrangements. Appropriate linkages to be described hereinafter are provided for controlling relative movement of the upper body frame section relative to the base frame and also for controlling relative movement of the thigh and lower leg sections.

In accordance with the present invention, the upper frame is formed with
30 inwardly and upwardly opening angles for receiving removable panels. The articulating frame of the present invention comprises four separate removable panels which are received in their respective frame sections to provide a platform for

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supporting a mattress. These panels may be some type of lightweight, rigid wood-product members, the upper surfaces of which may be coated or covered with a decorative pattern or material. By having these removable panels, the upper frame is much easier to deliver and install. In addition, all of the electrical controls and the drive mechanisms for the articulating frame may be mounted on the underside of the seat panel.

While one embodiment of the present invention is designed to be placed on top of a conventional bed frame to replace a conventional box spring, the present invention also contemplates a stand-alone frame assembly which can be taken apart and delivered in pieces by a single delivery person. In this embodiment of the present invention, a floor engaging base frame including four corner posts, longitudinally extending side rails and transversely extending end rails is provided. This floor engaging base frame may include adjustable corner posts or legs comprising, at each corner, an outer, vertically extending sleeve and an inner sleeve telescoped in the outer sleeve to move downwardly to an adjusted position to establish the height of the bed. The outer and inner telescopic sleeves may have longitudinally spaced apart openings through which adjustment pins can be inserted to select the height of the floor engaging base frame. The inner sleeve may carry at its lower end a roller caster or an isolation pad or, for that matter, a roller caster which is connected to the inner sleeve by means of an isolation pad. The isolation pads will be particularly helpful if the mattress placed on the frame assembly has a vibration massage capability.

Further, in this embodiment, the channel tracks are provided in the side rails of the floor engaging base frame. Then, the articulating upper frame with its pop-out panels as described above is mounted atop the floor engaging base frame for rectilinear movement.

In still further embodiment of the present invention, the floor engaging base frame with channel tracks is positioned inside a conventional bed frame or inside a conventional sleigh frame. A carriage is mounted on the floor engaging base frame for longitudinal motion. An upper deck comprising a set of four longitudinally spaced apart and transversely extending panel sections is mounted on the carriage. The panel sections are hinged together to provide for articulating movement of at least the upper body, thigh and lower leg panel sections. The seat panel section is bolted to the

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carriage, and remains stationary and flat. These panels may be some type of lightweight, sturdy, rigid wood-product members, such as Oriented Strand Board or OSB.

The present invention, therefore, is a bed frame including a base frame and an articulating upper frame. The base frame comprises a head end, a foot end and oppositely-disposed longitudinally extending sides. An articulating upper frame or deck comprises an upper body section, a seat section, a thigh section and a lower leg section. These sections are longitudinally spaced apart and transversely extended, and at least the upper body, thigh and lower leg sections are movable with respect to the seat section to provide for articulating movement. The upper frame is mounted on the base frame for longitudinal shifting of the upper frame relative to the base frame. A drive assembly for raising and lowering the upper body section relative to the base frame includes linkage connected to the upper body section such that, tilting movement of the upper body section shifts the upper frame longitudinally relative to the base frame. When the upper body section is tilted upwardly, the upper frame shifts longitudinally toward the head end of the bed; and when the upper body section tilts downwardly, the upper frame shifts longitudinally toward the foot end of the bed. A second drive assembly for raising and lowering the thigh section relative to the base frame includes linkage connected to the lower leg section such that, when the thigh section is tilted upwardly, the lower leg section is tilted downwardly.

Additional features, and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment exemplifying the best mode of carrying out the invention as presently perceived.

Brief Description of the Drawings

The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a bottom, left and front perspective view of one embodiment of the present invention showing a multi-part SKD frame assembly comprising a base frame which is mountable on a conventional bed frame, a carriage mounted on the base frame for rectilinear motion and an articulating upper frame mounted on the carriage,

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Fig. 1a diagrammatically shows the pop-out panels or decks arranged for reception in the articulating upper frame to form a platform for a mattress,

Fig. 1b diagrammatically shows electrical hand controls for operating first and second drives for lifting and lowering the upper body frame section and for lifting and
5 lowering the thigh and lower leg frame sections respectively;

Fig. 2 shows a sectional end view of the Fig. 1 frame assembly, taken along the line 2-2 in Fig. 1, showing the inwardly facing channels of the base frame, the carriage having rollers riding in the channels, and further showing the first and second drives mounted on the carriage;

10 Fig. 3 shows a top view of the Fig. 1 frame assembly showing the base frame, the carriage riding in the base frame and the articulating upper frame mounted on the carriage;

Fig. 4 shows a front sectional view of the Fig. 1 frame assembly with the articulating upper frame disposed in a horizontal position;

15 Fig. 5 is a view similar to Fig. 4 of the frame assembly with the upper body frame section and the thigh frame section raised;

Fig. 6 is a bottom, left and front perspective view of a second embodiment of the present invention, similar to the Fig. 1 embodiment, showing a floor engaging base frame with side rails having channel tracks and four corner posts or legs, a carriage
20 mounted on the floor engaging base frame for longitudinal sliding motion and an articulating upper frame mounted on the carriage;

Fig. 7 is a perspective view showing a preferred leg assembly for the Fig. 6 frame assembly;

Fig. 7a is a cross-sectional view of an isolation pad for use with a mattress
25 having a vibration massage capability;

Fig. 8 is a sectional view, similar to Fig. 4, of the Fig. 6 frame assembly showing the articulating upper frame in the horizontal position;

Fig. 9 is a top, right and front exploded perspective view of a third embodiment of the present invention showing a floor engaging base frame, similar to the Fig. 6 floor engaging base frame, but positioned inside the well formed by a conventional bed
30 frame, a carriage mounted on the floor engaging base frame and an articulating upper deck mounted on the carriage;

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Fig. 9a is a perspective view showing an adjustable pad leveler attached to the corner posts of the floor engaging base frame of Fig. 9;

Fig. 10 is a front view, similar to Figs. 4 and 8, of the Fig. 9 frame assembly showing the articulating upper deck in the horizontal position;

5 Fig. 11 is a front view, similar to Fig. 10, of the Fig. 9 frame assembly showing the upper body panel section and the thigh panel section in the raised position;

Fig. 12 is a partial exploded perspective view of the articulating upper deck, showing the four panel sections, a decorative skirt to be glued to the panel sections around the perimeter thereof, two massage units, a mattress pad and an electrical
10 control box;

Figs. 13, 13a are diagrammatic views of the construction of a typical articulating upper deck, a foundation foam disposed on the upper deck and a mattress disposed on the foundation foam, and further showing the location of the pivot point for the upper body panel section; and

15 Figs. 14, 14a are diagrammatic views of the construction of an articulating upper deck according to the present invention, a mattress disposed on the upper deck, and further showing the location of the in-line pivot point for the upper body panel section.

20 Detailed Description of the Drawings

The frame assembly 10 shown in Fig. 1 comprises a base frame or channel frame 12 including a pair of inwardly facing, longitudinally extending side rails or channels 14, 16 which are held in laterally spaced apart position by four longitudinally spaced apart, transversely extending strut members 18, 20, 22, 24. The base frame 12
25 can be picked up and carried by a single delivery person and is designed to be set atop a conventional bed frame in the position that is shown in Fig. 1. A carriage 30 having rollers 32 is mounted on the base frame 12 for rectilinear movement. The inwardly facing channels 14, 16 of the base frame 12 serve as longitudinally extending guides or tracks for rollers 32.

30 An articulating upper frame 40 is mounted on the carriage 30. This articulating frame 40 comprises an upper body frame section 42, a seat frame section 44, a thigh frame section 46 and a lower leg frame section 48. As shown in Figs. 3-5, these frame

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sections are fabricated from upwardly and inwardly opening channel members and are hinged together in a conventional manner. Essentially, the upper body frame section 42 and the thigh frame section 46 pivot upwardly from the seat frame section 44 in a conventional manner. When the thigh frame section 46 pivots upwardly, the lower leg frame section 48 tilts downwardly from the thigh frame section in the manner shown in Figs. 4 and 5.

The base frame 12, the carriage 30 and the articulating upper frame 40 are all made from suitable high strength, lightweight, rigid materials, such as aluminum, steel, high strength plastic or a composite.

10 In accordance with the present invention, each of these frame sections 42-48 carries a pop-out panel or deck which is received within the upwardly and inwardly opening channels of the frame section. These pop-out panels are shown in Fig. 1a and identified as panels 42a, 44a, 46a and 48a corresponding respectively to the frame sections 42, 44, 46, 48. The panels may be made from any type of rigid lightweight
15 panel material and are conveniently made from plywood, chip board or OSB board very well known in the furniture business. These panels 42a, 44a, 46a, 48a may be covered with decorative material or somehow coated to have a pleasing appearance. Each panel 42a, 44a, 46a and 48a will drop into its respective frame section 42, 44, 46, 48 to be held there by the weight of the panel and any mattress placed on the
20 articulating frame.

The seat frame section 44 is supported by and bolted to the carriage 30 by a set of bolts as shown. The seat frame section 44 may preferably carry the electrical controls for the first and second drive systems 50, 52 that move the upper body frame section 42, the thigh frame section 46 and the lower leg frame section 48 in the manner
25 described below. Alternately, as diagrammatically shown in Fig. 1b, a wired remote control unit 54 may be provided for operating the two drive systems. Although a wired remote control unit is shown in Fig. 1b, it is contemplated that one may instead use a wireless remote control unit for convenience.

In a conventional fashion, the first drive system 50 is provided for lifting and
30 lowering the upper body frame section 42, and the second drive system 52 is provided for lifting and lowering the thigh frame section 36. These two drive systems 50, 52 may conventionally comprise electrical motors and lead screws such as are

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conventionally used to drive articulating frame sections. A suitable electrical motor for use with the drive systems 50, 52 is a linear actuator motor, Model No. LA 31.1, made by Linak Company of Denmark. It will be appreciated, however, that any number of different type of drive mechanisms may be used in accordance with the present invention. Such systems may include hydraulic systems as well as pneumatic drives. In preferred systems, the person lying on the bed manipulates electrical controls on the hand unit 54 to make the bed move to a more comfortable position.

As shown in Figs. 1 and 3, the first and second ends 50', 50" of the first drive system 50 are pivotally connected to the carriage 30 and the strut member 22 of the base frame 12, respectively. The first drive system 52 serves to move the carriage 30 longitudinally in the channels 14, 16. Similarly, the first and second ends 52', 52" of the second drive system 52 are pivotally connected to the carriage 30 and a bracket 56 attached to the thigh frame section 46, respectively. The second drive system 52 serves to lift and lower the thigh frame section 46.

The upper body frame section 42 is connected by links 60 to the head ends of the side rails 14, 16 by pins 60', 60". When the carriage 30 moves along the channels 14, 16 toward the headboard, the links 60 cause the upper body frame section 42 to tilt upwardly from its horizontal position. The linkage assembly 60 causes the upper body frame section 42 to move back toward its horizontal position when the carriage 30 moves toward the footboard. A pair of support members 62 is welded to the head ends of the side rails 14, 16 for supporting the upper body frame section 42 when the articulating bed frame 40 is flat or horizontal.

A pair of links 70, 72 is provided for controlling the movement of the lower leg frame section 48 relative to the base frame 12. The first and second ends 70', 70" of the links 70 are pivotally connected to the carriage 30 and the lower leg frame section 48 respectively. A pair of support brackets 72 carrying the rollers 74 is secured to the underside of the lower leg frame section 48. The rollers 74 rest on the side rails 14, 16 when the lower leg frame section 48 is flat. When the thigh frame section 46 is raised by the drive system 52, the links 70 cause the lower leg frame section 48 to pivot downwardly as shown in Fig. 5.

A second embodiment of the present invention will now be described in conjunction with Figs. 6-8. (It will be noted that the like components in all the

embodiments are designated by like numerals.) The frame assembly 110 comprises a stand-alone floor engaging base frame 112 having longitudinally extending side rails 114, 116, transversely extending strut members 118-124 and four corner posts or legs 126 at four corners of the bed. This floor engaging base frame 112 will serve in place of the conventional bed frame discussed above. Decorative padded panels (not shown) may be suspended from the side and end rails of the bed to give it a desired appearance.

The height adjustment mechanism is best seen in the perspective view of Fig. 7. Each leg 126 comprises an outer sleeve 180 rigidly attached to the floor engaging base frame 112 and a telescoping inner sleeve 182 which will move selectively downwardly to raise the elevation of the upper portion of the floor engaging base frame 112. Illustratively, the inner sleeve 182 may be provided with a series of vertically spaced openings 184. A selector pin 186 may be carried on a stiff leaf spring 188 to extend through an opening 180' in the outer sleeve 180 into one of the selected openings 184 in the inner sleeve 182. The lower end of the inner sleeve 182 may carry an isolation pad assembly 190.

The isolation pad assembly 190 isolates the floor engaging base frame 112 from the floor in case the user of the articulating frame energizes a vibrator mode on the mattress disposed on the frame. As illustrated in Fig. 7a, the isolation pad 190 includes a stem 192 secured to the inner sleeve 192, a load-bearing washer 194, elastomeric damping material 196 and a housing 198. The stem 192 and the load-bearing washer 194 may be made from a suitable high strength steel. The housing 198 may be made from a suitable high strength plastic. The elastomeric material 196 may be styrene butadiene rubber.

Once the floor engaging base frame 112 of the frame assembly 110 is carried into the residence of a purchaser, a carriage 130 and an articulating upper frame 140 (such as that shown and described in conjunction with Figs. 1-5) may be mounted on the floor engaging base frame to provide the same features as those discussed in connection with Figs. 1-5.

A third embodiment of the present invention is shown in Figs. 9-12. The frame assembly 210 comprises a floor engaging base frame 212, a carriage 230 mounted on the base frame and an articulating upper deck 240 mounted on the carriage. In this

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embodiment, the floor engaging base frame 212 is disposed inside a conventional bed frame 200. The conventional bed frame 200 may include a headboard 202, a footboard 204, a pair of longitudinally extending side rails 206 interconnecting the headboard and footboard, and a pair of transversely extending strut members 208.

5 The floor engaging base frame 212 of the third embodiment, like the floor engaging base frame 112 of the second embodiment, comprises a pair of longitudinally extending sides 214, 216, a pair of longitudinally spaced and transversely extending strut members 218, 220 and four vertically-adjustable corner posts 226. The ends of the strut members 218, 220 are supported by the upwardly and inwardly opening side rails 206 of the conventional bed frame 200. The reception of the strut members 218, 220 in the side rails 206 of the bed frame 200 serves to stabilize the floor engaging base frame 212. In particular, it prevents the rotation and side-to-side motion of the floor engaging base frame 212 relative to the bed frame 200.

10 Typically, the beds in the consumer homes are of varying heights and of varying structural integrity. It is, therefore, desirable to equip the corner posts 226 with great flexibility for the height adjustment. To this end, as shown in Fig. 9a, the corner posts 226 are provided with threaded pad levelers 226'. The pad levelers 226' may be screwed into the tapped inserts 226" mounted inside the ends of the inner sleeves 282. The rest of the construction of the corner posts 226 is the same as the configuration shown in Fig. 7a. In operation, the struts 218, 220 rest on the side rails 206 of an existing bed frame 200 and the corner posts 226 are then adjusted so that the load of the person occupying the bed is transferred to the floor through the corner posts.

20 The rollers 232 mounted to the carriage 230 are received in the inwardly opening channels of the side rails 214, 216 for supporting the rectilinear motion of the carriage. First and second drives 250, 252 are mounted on the carriage 230 for lifting and lowering the upper body section and the thigh section, respectively, of the articulating upper deck 240.

25 As shown in Fig. 12, the articulating upper deck 240 comprises an upper body panel section 242, a seat panel section 244, a thigh panel section 246 and a lower leg panel section 248. The longitudinally spaced, transversely extending panel sections 242-248 are hinged together to form a platform for the mattress and to provide

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articulating movement of the upper deck 240. The panel sections 242-248 are made from suitable high strength, lightweight rigid material, such as an OSB board. It will be seen that this embodiment does away with separate frame elements used in the first two embodiments.

5 The upper body panel section 242 has an opening 242' for receiving a vibration massage unit 300 for the upper back portion of the body. The lower leg panel section 248, on the other hand, has two openings 248', 248" - one for receiving a leg massage unit 302 and the other for receiving an electrical control box 304, respectively. The massage units 300, 302 transmit vibrations to the person lying on the bed through the
10 respective transmission boards 300', 302'. Any suitable mechanism, such as speaker coils, may be used for driving the massage units 300, 302. The electrical control box 304 houses the electronic circuits for controlling the operation of various electrical systems. A mattress pad 306, made from a resilient foam material, is disposed on the top of the panel sections 242-248 to cushion the feel of the deck. The vibrations from
15 the massage units 300, 302 are transmitted to the person lying on the bed through the foam pad 306. The foam pad 306 additionally serves to reduce the effects of the vibrations on the bed frame.

 The foam pad 306 has an opening 306' for providing access to the electrical control box 304 for inspection or repairs. The convenient location of the control box
20 304 on the lower leg panel section 248 provides easy access to the electronic circuits without having to turn the bed upside down when the repairs are needed.

 A decorative padded shroud or skirt 308, also made from a resilient foam material, is glued around the perimeter of the panel sections 242-248. The foam shroud 308 serves to give the upper deck 240 a familiar box-spring like look. It also serves to
25 conceal the mechanisms and electrical circuits disposed on the underside of the upper deck 240 and to reduce the risk of accident or injury. A plurality of slits 308' may be provided in the foam shroud 308 to allow it to bend easily when the upper body panel section 242 and the thigh panel section 246 are articulated.

 First and second ends of the first drive 250 are pivotally secured to the carriage
30 230 and to the strut member 220, respectively. Similarly, the first and second ends of the second drive 252 are respectively secured to the carriage 230 and a lift arm bracket 256 pivotally mounted on the carriage.

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As shown in Figs. 10 and 11, the upper body panel section 242 is pivotally connected by links 260 to the head-ends of the side rails 214, 216 of the base frame 212. One end of each of the links 260 is pivotally connected to a bracket 260' fixedly mounted to the upper body panel section 242. The other end of each of the links 260 is pivotally secured to the respective one of the side rails 214, 216 by pins 260" (shown in Fig. 9). When the carriage 230 moves along the channels 214, 216 toward the headboard 202, the upper body panel section 242 is tilted upwardly from its horizontal position. The upper body panel section 242 is tilted downwardly toward its horizontal position when the carriage 230 moves toward the footboard 204. When the upper body panel section 242 is horizontal or flat, it rests on the two corner posts 226 disposed near the headboard 202.

When the second drive 252 is activated, it pivots the lift arm bracket 256 about its axis as shown in Fig. 11. When the lift arm bracket 256 is pivoted, a pair of rollers 258 secured to the arms of the lift arm bracket engages the underside of the thigh panel section 246 to tilt it upwardly. The lower leg panel section 246 is connected by links 270 to the carriage 230. One end of each of the links 270 is pivotally connected to a bracket 270' fixedly mounted to the lower leg panel section 248. The other end of each of the links 270 is pivotally secured to the carriage by pins 270". The links 270 are pivotally connected at their ends such that, when the thigh panel section 246 is raised, the lower leg panel section 248 is tilted downwardly, and such that, when the thigh panel section 246 is lowered, the lower leg panel section 248 is returned to its normal horizontal position.

Another feature of the present invention will now be described in conjunction with Figs. 13, 13a, 14 and 14a. Fig. 13 illustrates the construction of a typical articulating bed. As shown, a mattress 400 lies on a foundation foam 402, which, in turn, lies on an articulating upper deck 440. The deck 440 is articulated about a pivot point 450 disposed under the deck through linkages (not shown). As shown in Fig. 13a, when the upper body panel section 442 is tilted upwardly, it rotates forward about the pivot point 450, thereby compressing the foundation foam 402 between the upper body panel section and the seat panel section 444. This causes the mattress 400 to extend beyond the foundation foam 402 and the upper body panel section 442 to, not

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only compromises the appearance, but also to generate wear, noise and static electricity.

Figs. 14, 14a demonstrate the construction of a bed assembly according to the present invention. As illustrated in Fig. 14, a mattress 500 lies on an articulating upper
5 deck 540. Although not shown, a thin foam pad (like the one shown in Fig. 12) may be disposed between the deck 540 and the mattress 500. The deck 540 is articulated about an in-line pivot point 550 lying between the upper body panel section 542 and the seat panel section 544 (instead of pivoting the upper deck about a pivot point disposed below the deck as shown in Figs. 13, 13a). It is desirable to have the pivot
10 point 550 as close as possible to the upper supporting surface of the deck 540. A decorative padded foam shroud 508 is glued around the perimeter of the panel sections 542-548. Thus, the foam shroud 508 is under the panel sections 542-548, not over it. As illustrated in Fig. 14a, when the upper body panel section 542 is tilted upwardly, it rotates about the in-line pivot point 550 without extending the mattress
15 500 beyond the upper body panel section 542.

It will be seen, therefore, that the articulating frame assembly (10, 110, or 210) of the present invention comprises a base frame (12, 112, or 212) onto which a carriage (30, 130 or 230), carrying the drive systems (50 and 52, 150 and 152, or 250 and 252), is mounted. The carriage (30, 130, or 230) is slid into the channels (14 and
20 16, 114 and 116, or 214 and 216) in the assembly process. The articulating upper frame (40, 140, or 240) is then mounted on the carriage (30, 130, or 230) by bolting the seat frame section (44, 144, or 244) to the carriage. The drive systems (50 and 52, 150 and 152, or 250 and 252) and the links (60 and 70, 160 and 170, or 260 and 270) are then hooked to the base frame (12, 112, or 212) and the articulating upper frame
25 (40, 140, or 240). The pop-out panels (42a, 44a, 46a and 48a, or 142a, 144a, 146a and 148a) are then dropped into the corresponding frame sections (42, 44, 46 and 48 or 142, 144, 146 and 148) in the first two embodiments. In the third embodiment, the frame sections (42, 44, 46 and 48 or 142, 144, 146 and 148) are eliminated and, instead, the panel sections (242, 244, 246 and 248) are hinged together to form the
30 articulating upper deck (240).

CLAIMS :

1. A bed frame (210) comprising:
 - (a) a base frame (212) having a head end, a foot end, and opposite longitudinally extending sides (214, 216),
 - 5 (b) a carriage (230) mounted on the base frame (212) for longitudinal shifting of the carriage (230) relative to the base frame (212),
 - (c) an articulating upper frame (240) mounted on the carriage (230) and comprising an upper body frame section (242), a seat frame section (244), a thigh frame section (246) and a lower leg frame section (248), the upper body, seat, thigh
 - 10 and lower leg frame sections (242-248) being longitudinally spaced apart and transversely extending with at least the upper body frame section (242) movable relative to the base frame (212) to provide for articulating movement thereof,
 - (d) a first drive assembly (250) for raising and lowering the upper body frame section (242) relative to the base frame (212), the first drive assembly
 - 15 (250) including a first linkage assembly (260) connected to the articulating upper frame (240) such that, tilting movement of the upper body frame section (242) shifts the articulating upper frame (240) longitudinally relative to the base frame (212),
- wherein the base frame (212) includes four corner posts (226) rigidly attached to the longitudinally extending sides (214, 216) to form a floor engaging base
- 20 frame (212), wherein the floor engaging base frame (212), carriage (230) and articulating upper frame (240) are separable to be assembled upon delivery, wherein each corner post (226) includes an outer sleeve (280) rigidly attached to the floor engaging base frame (212) and a telescoping inner sleeve (282) which is movable downwardly to permit raising of the floor engaging base frame (212) relative to a
- 25 floor, wherein each telescoping inner sleeve (282) has a plurality of vertically spaced openings therein (284), wherein each outer sleeve (280) includes a selector pin (286) disposed on a leaf spring (288) mounted on the outer sleeve (280), wherein the selector pin (286) engages a selected one of the openings (284) in the inner sleeve (282) to allow raising of the floor engaging base frame (212) relative to the floor,
- 30 wherein each inner sleeve (282) of each post (226) carries an adjustable pad leveler (226'), and wherein each pad leveler (226') includes a threaded stem secured to an insert (226'') mounted to an end of each of the inner sleeves (282).

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2. A bed frame (110) comprising:

- (a) a base frame (112) having a head end, a foot end, and opposite longitudinally extending sides (114, 116),
- (b) a carriage (130) mounted on the base frame (112) for longitudinal shifting of the carriage (130) relative to the base frame (112),
- (c) an articulating upper frame (140) mounted on the carriage (130) and comprising an upper body frame section (142), a seat frame section (144), a thigh frame section (146) and a lower leg frame section (148), the upper body, seat, thigh and lower leg frame sections (142-148) being longitudinally spaced apart and transversely extending with at least the upper body frame section (142) movable relative to the base frame (112) to provide for articulating movement thereof,
- (d) a first drive assembly (150) for raising and lowering the upper body frame section (142) relative to the base frame (112), the first drive assembly (150) including a first linkage assembly (160) connected to the articulating upper frame (140) such that, tilting movement of the upper body frame section (142) shifts the articulating upper frame (140) longitudinally relative to the base frame (112),
- wherein the base frame (112) includes four corner posts (126) rigidly attached to the longitudinally extending sides (114, 116) to form a floor engaging base frame (112), wherein the floor engaging base frame (112), carriage (130) and articulating upper frame (140) are separable to be assembled upon delivery, wherein each corner post (126) includes an outer sleeve (180) rigidly attached to the floor engaging base frame (112) and a telescoping inner sleeve (182) which is movable downwardly to permit raising of the floor engaging base frame (112) relative to a floor, wherein each telescoping inner sleeve (182) has a plurality of vertically spaced openings (184) therein, wherein each outer sleeve (180) includes a selector pin (186) disposed on a leaf spring (188) mounted on the outer sleeve (180), wherein the selector pin (186) engages a selected one of the openings (184) in the inner sleeve (182) to allow raising of the floor engaging base frame (112) relative to the floor, wherein each inner sleeve (182) of each post (126) carries an isolation pad assembly (190) to isolate the floor engaging base frame (112) from the floor, and wherein each isolation pad assembly (190) comprises a housing (198) forming a cavity, an

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elastomeric material (196) disposed in the cavity, a load bearing washer (194) coupled to the elastomeric material (196) and secured to the respective inner sleeve (182).

3. A bed frame (110) comprising:

- 5 (a) a base frame (112) having a head end, a foot end, and opposite longitudinally extending sides (114, 116) and, at each of its sides, a longitudinally extending guide track,
- (b) a carriage (130) mounted on the guide tracks for longitudinal shifting of the carriage (130) relative to the base frame (112),
- 10 (c) an articulating upper frame (140) mounted on the carriage (130) and comprising an upper body frame section (142), a seat frame section (144), a thigh frame section (146) and a lower leg frame section (148), the upper body, seat, thigh and lower leg frame sections (142-148) being longitudinally spaced apart and transversely extending with at least the upper body, thigh and lower leg frame sections (142, 146 and 148) hinged together to provide for articulating movement thereof,
- 15 (d) a drive assembly (150) for raising and lowering the upper body frame section (142) relative to the seat frame section (144), the drive assembly (150) including linkage (160) connected to the base frame (112) and the articulating body frame section (142) such that, tilting movement of the upper body frame section (142) shifts the articulating upper frame (140) longitudinally relative the base frame (112),
- 20 wherein the base frame (112) includes four corner posts (126) rigidly attached to the longitudinally extending sides (114, 116) to form a floor engaging base frame (112), wherein the floor engaging base frame (112), carriage (130) and articulating upper frame (140) are separable to be assembled upon delivery, wherein each corner post (126) includes an outer sleeve (180) rigidly attached to the floor
- 25 engaging base frame (112) and a telescoping inner sleeve (182) which is movable downwardly to permit raising of the floor engaging base frame (112) relative to a floor, wherein each telescoping inner sleeve (182) has a plurality of vertically spaced openings (184) therein, wherein each outer sleeve (180) includes a selector pin (186) disposed on a leaf spring (188) mounted on the outer sleeve (180), wherein the
- 30 selector pin (186) engages a selected one of the openings (184) in the inner sleeve (182) to allow raising of the floor engaging base frame (112) relative to a floor, wherein each inner sleeve (182) of each post (126) carries an isolation pad assembly

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(190) to isolate the floor engaging base frame (112) from the floor, and wherein each isolation pad assembly (190) comprises a housing (198) forming a cavity, an elastomeric material (196) disposed in the cavity, a load bearing washer (194) coupled to the elastomeric material (196) and secured to the respective inner sleeve (182).

- 5 4. A bed frame (110) comprising:
- (a) a base frame (112) having a head end, a foot end, and opposite longitudinally extending sides (114, 116) and, at each of its sides, a longitudinally extending guide track,
- (b) a carriage (130) mounted on the guide tracks for longitudinal
10 shifting of the carriage (130) relative to the base frame (112),
- (c) an articulating upper frame (140) mounted on the carriage (130) and comprising an upper body frame section (142), a seat frame section (144), a thigh frame section (146) and a lower leg frame section (148), the upper body, seat, thigh and lower leg frame sections (142-148) being longitudinally spaced apart and
15 transversely extending with at least the upper body, thigh and lower leg frame sections (142, 146 and 148) hinged together to provide for articulating movement of at least the upper body, thigh and lower leg frame sections (142, 146 and 148),
- (d) a drive assembly (150) for raising and lowering the upper body frame section (142) relative to the seat frame section (144) and for raising and
20 lowering the thigh frame section (146) relative to the seat frame section (144), the drive assembly being connected to the base frame (112) and the upper frame (140) such that, tilting movement of the upper body frame section (142) upwardly will shift the upper frame (140) longitudinally toward the head end of the base frame (112) and tilting movement of the upper body frame section (142) downwardly will shift the
25 upper frame (40) longitudinally toward the foot end of the base frame (12),
- wherein the base frame (112) includes four corner posts (126) rigidly attached to the longitudinally extending sides (114, 116) to form a floor engaging base frame (112), wherein the floor engaging base frame (112), the carriage (130) and the articulating upper frame (140) are separable to be assembled upon delivery, wherein
30 each corner post (126) includes an outer sleeve (180) rigidly attached to the floor engaging base frame (112) and a telescoping inner sleeve (182) which is movable downwardly to permit raising of the floor engaging base frame (112) relative to a

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floor, wherein each telescoping inner sleeve (182) has a plurality of vertically spaced openings (184) therein, wherein each outer sleeve (180) includes a selector pin (186) disposed on a leaf spring (188) mounted on the outer sleeve (180), wherein the selector pin (186) engages a selected one of the openings (184) in the inner sleeve (182) to allow raising of the floor engaging base frame (112) relative to the floor, wherein each inner sleeve (182) of each post (126) carries (126) an isolation pad assembly (190) to isolate the floor engaging base frame (112) from the floor, and wherein each isolation pad assembly (190) comprises a housing (198) forming a cavity, an elastomeric material (196) disposed in the cavity, a load bearing washer (194) coupled to the elastomeric material (196) and secured to the respective inner sleeve (182).

5. A bed frame (10) comprising:

- (a) a base frame (12) having a head end, a foot end, and opposite longitudinally extending sides (14, 16),
- 15 (b) a carriage (30) mounted on the base frame (12) for longitudinal shifting of the carriage (30) relative to the base frame (12),
- (c) an articulating upper frame (40) comprising at least an upper body frame section (42) and a seat frame section (44), the upper body and seat frame sections (42, 44) being longitudinally spaced apart and transversely extending with the upper body frame section (42) movable relative to the seat frame section (44) to provide articulating movement thereof with respect to the seat frame section (44) and with the seat frame section (44) being mounted on the carriage (30) for motion therewith,
- 20 (d) a first drive assembly (50), operatively connected between the carriage (30) and the base frame (12), for longitudinally shifting the carriage (30) relative to the base frame (12), and
- 25 (e) a first linkage assembly (60) connected to the upper body frame section (42) and the base frame (12) such that longitudinal shifting of the carriage (30) relative to the base frame (12) results in articulating movement of the upper body frame section (42) with respect to the seat frame section (44).
- 30

6. The bed frame (10) of claim 5 wherein the upper body frame section (42) is hinged to the seat frame section (44) about an axis disposed between the upper body frame section (42) and the seat frame section (44).

7. The bed frame (10) of claim 5 wherein the first linkage assembly (60) connected to the upper body frame section (42) and the base frame (12) causes the upper body frame section (42) to tilt upwardly when the carriage (30) shifts longitudinally toward the head end of the bed, and causes the upper body frame section (42) to tilt downwardly when the carriage (30) shifts longitudinally toward the foot end of the bed.

8. The bed frame (10) of claim 5 wherein at least the upper body and seat frame sections (42, 44) comprise a frame section and a removable panel section (42a, 44a) to be assembled in the frame section upon delivery to provide a platform for supporting a mattress.

9. The bed frame (10) of claim 5 wherein the base frame (12), the carriage (30) and the articulating upper frame (40) are separable to be assembled upon delivery, the first drive assembly (50) being mounted on one of the carriage (30) and the base frame (12) to be connected to the other one of the carriage (30) and the base frame (12) during assembly, and the first linkage assembly (60) being mounted on one of the upper body frame section (42) and the base frame (12) to be connected to the other one of the upper body frame section (42) and the base frame (12) during assembly.

10. The bed frame (10) of claim 9 wherein the longitudinally extending sides (14, 16) of the base frame (12) are configured to form inwardly opening channels serving as guide tracks for rollers (32) mounted on the carriage (30) to facilitate assembly of the carriage (30) to the base frame (12) and to accommodate longitudinal shifting of the carriage (30) relative to the base frame (12).

11. The bed frame (10) of claim 10 wherein at least the upper body and seat frame sections (42, 44) comprise a frame section and a removable panel section (42a, 44a) to be assembled in the frame section upon delivery to provide a platform for supporting a mattress.

12. The bed frame (10) of claim 11 wherein each of the upper body and seat frame sections (42, 44) comprises inwardly and upwardly opening frame elements forming a well for receiving a removable panel section (42a, 44a).

13. The bed frame (10) of claim 12 wherein each of the panel
5 sections (42a, 44a) is made from a plywood or chipboard base.

14. The bed frame (10) of claim 5 wherein each of the upper body and seat frame sections (42, 44) comprises a panel section (42a, 44a), the panel sections (42a, 44a) being hinged together to provide a platform for supporting a mattress and for permitting the articulating movement of the upper body frame
10 section (42).

15. The bed frame (10) of claim 14 wherein each of the panel sections (42a, 44a) is made from a plywood or chipboard base.

16. The bed frame (10) of claim 5 for use with a conventional bed frame, wherein the base frame (12) is proportioned and designed to be mounted on top
15 of a conventional bed frame (10) to replace a conventional box spring.

17. The bed frame (10) of claim 5 wherein the base frame (12) includes four corner posts (126) attached to the longitudinally extending sides (14, 16) to form a floor engaging base frame (12), the floor engaging base frame (12), the carriage (30) and the articulating upper frame (40) being separable to be assembled
20 upon delivery.

18. The bed frame (10) of claim 17 wherein each corner post (126) includes an outer sleeve (180) attached to the floor engaging base frame (12) and a telescoping inner sleeve (182) which is movable downwardly to permit raising of the floor engaging base frame (12) relative to a floor.

19. The bed frame (10) of claim 18 wherein each telescoping inner sleeve (182) has a plurality of vertically spaced openings therein, and wherein each outer sleeve (180) includes a selector pin disposed on a leaf spring mounted on the outer sleeve (180), the selector pin engaging a selected one of the openings in the inner sleeve (182) to allow raising of the floor engaging base frame (12) relative to the
25 floor.
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20. The bed frame (10) of claim 19 wherein each inner sleeve (182) of each post (126) carries an adjustable pad leveler (226').

21. The bed frame (10) of claim 20 wherein each pad leveler (226') includes a threaded stem secured to an insert mounted to an end of each of the inner sleeves (182).

22. The bed frame (10) of claim 18 wherein each inner sleeve (182)
5 of each post (126) carries an isolation pad assembly (190) to isolate the floor engaging base frame (12) from the floor.

23. The bed frame (10) of claim 22 wherein each isolation pad assembly (190) comprises a housing (198) forming a cavity, an elastomeric material (196) disposed in the cavity, a load bearing washer (194) coupled to the elastomeric
10 material (196) and secured to the respective inner sleeve (182).

24. The bed frame (10) of claim 5 wherein the longitudinally extending sides (14, 16) of the base frame (12) are configured to form inwardly opening channels serving as guide tracks for rollers (32) mounted on the carriage (30) to accommodate longitudinal shifting of the carriage (30) relative to the base frame
15 (12).

25. The bed frame (10) of claim 5 wherein the articulating upper frame (40) also includes a thigh frame section (46) and a lower leg frame section (48) which the thigh and lower leg frame sections (46, 48) are also movable with respect to each other to provide for articulating movement thereof, the bed frame (10) further
20 including a second drive assembly (52) for raising and lowering the thigh frame section (46) relative to the seat frame section (44) and a second linkage assembly (70) connected to the lower leg frame section (48) such that tilting movement of the thigh frame section (46) tilts the lower leg frame section (48) relative to the base frame (12).

25 26. The bed frame (10) of claim 25 wherein the second linkage assembly (70) is connected between the lower leg frame section (48) and the carriage (30) such that when the thigh frame section (46) is tilted upwardly, the second linkage assembly (70) tilts the lower leg frame section (48) downwardly and such that when the thigh frame section (46) is tilted downwardly, the second linkage assembly (70)
30 tilts the lower leg frame section (48) to a horizontal position.

27. A bed frame (10) comprising:

- (a) a base frame (12) having a head end, a foot end, and opposite longitudinally extending sides (14, 16) and, at each of its sides, a longitudinally extending guide track,
 - 5 (b) a carriage (30) mounted on the guide tracks for longitudinal shifting of the carriage (30) relative to the base frame (12),
 - (c) an articulating upper frame (40) comprising an upper body frame section (42), a seat frame section (44), a thigh frame section (46) and a lower leg frame section (48), the upper body, seat, thigh and lower leg frame sections (42-
10 48) being longitudinally spaced apart and transversely extending with at least the upper body, thigh and lower leg frame sections (42, 46 and 48) movable to provide for articulating movement thereof, the seat frame section (44) being mounted on the carriage (30) for motion therewith,
 - (d) a first drive assembly (50), operatively connected between the
15 carriage (30) and the base frame (12), for longitudinally shifting the carriage (30) relative to the base frame (12), and
 - (e) a first linkage assembly (60) connected to the upper body frame section (42) and the base frame (12) such that longitudinal shifting of the carriage (30) relative to the base frame (12) results in the articulating movement of the upper body
20 frame section (42) with respect to the seat frame section (44).
28. The bed frame (10) of claim 27, wherein the upper body frame section (42) is hinged to the seat frame section (44) about an axis disposed between the upper body frame section (42) and the seat frame section (44).
29. The bed frame (10) of claim 27, wherein the first linkage
25 assembly (60) connected to the upper body frame section (42) and the base frame (12) causes the upper body frame section (42) to tilt upwardly when the carriage (30) shifts longitudinally toward the head end of the bed, and causes the upper body frame section (42) to tilt downwardly when the carriage (30) shifts longitudinally toward the foot end of the bed.
- 30 30. The bed frame (10) of claim 27 wherein each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) includes a removable panel section (42a-48a) respectively, wherein

each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) comprises inwardly and upwardly opening frame elements forming a well for receiving said respective removable panel section (42a-48a), wherein the frame elements and the removable panel sections (42a-48a) provide
5 a platform for supporting a mattress.

31. The bed frame (10) of claim 27 wherein the base frame (12), the carriage (30) and the articulating upper frame (40) are separable to be assembled upon delivery, the carriage (30) comprising rollers (32) which engage and roll in the guide tracks to accommodate longitudinal shifting of the carriage (30), the first drive
10 assembly (50) being mounted on one of the carriage (30) and the base frame (12) to be connected to the other one of the carriage (30) and the base frame (12) during assembly, and the first linkage assembly (60) being mounted on one of the upper body frame section (42) and the base frame (12) to be connected to the other one of the upper body frame section (42) and the base frame (12) during assembly.

32. The bed frame (10) of claim 31 wherein each of the upper body
15 frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) comprises inwardly and upwardly opening frame elements forming a well for receiving a removable panel section (42a-48a), wherein the frame elements and the removable panel sections (42a-48a) provide a platform for supporting a
20 mattress.

33. The bed frame (10) of claim 32 wherein each of the panel sections (42a-48a) is made from a plywood or chipboard base.

34. The bed frame (10) of claim 27 wherein each of the upper body
frame section (42), seat frame section (44), thigh frame section (46) and lower leg
25 frame section (48) comprises a panel section (42a-48a), the panel sections (42a-48a) being hinged together to provide a platform for supporting a mattress and for permitting the articulating movement of at least the upper body frame section (42).

35. The bed frame (10) of claim 34 wherein each of the panel sections (42a-48a) is made from a plywood or chipboard base.

36. The bed frame (10) of claim 27 for use with a conventional bed
30 frame, wherein the base frame (12) is proportioned and designed to be mounted on top of a conventional bed frame to replace a conventional box spring.

37. The bed frame (10) of claim 27 wherein the base frame (12) includes four corner posts (126) attached to the longitudinally extending sides (14, 16) to form a floor engaging base frame (12), the floor engaging base frame (12), the carriage (30) and the articulating upper frame (40) being separable to be assembled upon delivery.

38. The bed frame (10) of claim 37 wherein each corner post (126) includes an outer sleeve (180) attached to the floor engaging base frame (12) and a telescoping inner sleeve (182) which is movable downwardly to permit raising of the floor engaging base frame (12) relative to a floor.

39. The bed frame (10) of claim 38 wherein each telescoping inner sleeve (182) has a plurality of vertically spaced openings therein, and wherein each outer sleeve (180) includes a selector pin disposed on a leaf spring mounted on the outer sleeve (180), the selector pin engaging a selected one of the openings in the inner sleeve (182) to allow raising of the floor engaging base frame (12) relative to a floor.

40. The bed frame (10) of claim 39 wherein each inner sleeve (182) of each post (126) carries an adjustable pad leveler (226').

41. The bed frame (10) of claim 40 wherein each pad leveler (226') includes a threaded stem secured to an insert mounted to an end of each of the inner sleeves (182).

42. The bed frame (10) of claim 38 wherein each inner sleeve (182) of each post (126) carries an isolation pad assembly (190) to isolate the floor engaging base frame (12) from the floor.

43. The bed frame (10) of claim 42 wherein each isolation pad assembly (190) comprises a housing (198) forming a cavity, an elastomeric material (196) disposed in the cavity, a load bearing washer (194) coupled to the elastomeric material (196) and secured to the respective inner sleeve (182).

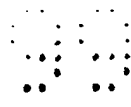
44. The bed frame (10) of claim 27 wherein the bed frame (10) further includes a second drive assembly (52) for raising and lowering the thigh frame section (46) relative to the seat frame section (44) and a second linkage assembly (70) connected to the lower leg frame section (48) such that tilting movement of the thigh frame section (46) tilts the lower leg frame section (48) relative to the base frame (12).

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45. The bed frame (10) of claim 44 wherein the second linkage assembly (70) is connected to the lower leg frame section (48) and the carriage (30) such that when the thigh frame section (46) is tilted upwardly, the second linkage assembly (70) tilts the lower leg frame section (48) downwardly and such that when
5 the thigh frame section (46) tilts downwardly, the second linkage assembly (70) tilts the lower leg frame section (48) to a horizontal position.

46. A bed frame (10) comprising:

- (a) a base frame (12) having a head end, a foot end, and opposite longitudinally extending sides (14, 16) and, at each of its sides, a longitudinally
10 extending guide track,
 - (b) a carriage (30) mounted on the guide tracks for longitudinal shifting of the carriage (30) relative to the base frame (12),
 - (c) an articulating upper frame (40) comprising an upper body frame section (42), a seat frame section (44), a thigh frame section (46) and a lower
15 leg frame section (48), the upper body, seat, thigh and leg frame sections (42-48) being longitudinally spaced apart and transversely extending and disposed to provide for articulating movement of at least the upper body, thigh and lower leg frame sections (42, 46 and 48), the seat frame section (44) being mounted on the carriage (30) for motion therewith,
 - (d) a first drive assembly (50), operatively connected between the
20 carriage (30) and the base frame (12), for longitudinally shifting the carriage (30) relative to the base frame (12),
 - (e) a first linkage assembly (60) connected to the upper body frame section (42) and the base frame (12) such that longitudinal shifting of the carriage (30)
25 relative to the base frame (12) results in tilting movement of the upper body frame section (42) with respect to the seat frame section (44),
 - (f) a second drive assembly (52) for raising and lowering the thigh frame section (46) relative to the seat frame section (44), and
 - (g) a second linkage assembly (70) connected to the lower leg
30 frame section (48) and the carriage (30) such that tilting movement of the thigh frame section (46) tilts the lower leg frame section (48) relative to the base frame (12).



47. The bed frame (10) of claim 46 wherein the first linkage assembly (60) connected to the upper body frame section (42) and the base frame (12) causes the upper body frame section (42) to tilt upwardly when the carriage (30) shifts longitudinally toward the head end of the bed and causes the upper body frame section (42) to tilt downwardly when the carriage (30) shifts longitudinally toward the foot end of the bed.

48. The bed frame (10) of claim 46 wherein each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) includes a removable panel section (42a-48a) respectively, wherein each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) comprises inwardly and upwardly opening frame elements forming a well for receiving said respective removable panel section (42a-48a), wherein the frame elements and the removable panel sections (42a-48a) provide a platform for supporting a mattress.

49. The bed frame (10) of claim 46 wherein the base frame (12), the carriage (30) and the articulating upper frame (40) are separable to be assembled upon delivery, the carriage (30) comprising rollers (32) which engage and roll in the guide tracks to accommodate longitudinal shifting of the carriage (30), the first drive assembly (50) being mounted on one of the carriage (30) and the base frame (12) to be connected to the other of the two during assembly, and the first linkage assembly (60) being mounted on one of the upper body frame section (42) and the base frame (12) to be connected to the other of the upper body frame section (42) and the base frame (12) during assembly.

50. The bed frame (10) of claim 49 wherein each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) includes a removable panel section (42a-48a) respectively, wherein each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) comprises inwardly and upwardly opening frame elements forming a well for receiving said respective removable panel section (42a-48a), wherein the frame elements and the removable panel sections (42a-48a) provide a platform for supporting a mattress.

51. The bed frame (10) of claim 50 wherein each of the panel sections (42a-48a) is made from a plywood or chipboard base.

52. The bed frame (10) of claim 46 wherein each of the upper body frame section (42), seat frame section (44), thigh frame section (46) and lower leg frame section (48) comprises a panel section (42a-48a), the panel sections (42a-48a) being hinged together to provide a platform for supporting a mattress and for permitting the articulating movement of at least the upper body frame section (42).

53. The bed frame (10) of claim 52 wherein each of the panel sections (42a-48a) is made from a plywood or chipboard base.

54. The bed frame (10) of claim 46 for use with a conventional bed frame, wherein the base frame (12) is proportioned and designed to be mounted on top of a conventional bed frame to replace a conventional box spring.

55. The bed frame (10) of claim 46 wherein the base frame (12) includes four corner posts (126) attached to the longitudinally extending sides (14, 16) to form a floor engaging base frame (12), the floor engaging base frame (12), the carriage (30) and the articulating upper frame (40) being separable to be assembled upon delivery.

56. The bed frame (10) of claim 55 wherein each corner post (126) includes an outer sleeve (180) attached to the floor engaging base frame (12) and a telescoping inner sleeve (182) which is movable downwardly to permit raising of the floor engaging base frame (12) relative to a floor.

57. The bed frame (10) of claim 56 wherein each telescoping inner sleeve (182) has a plurality of vertically spaced openings therein, and wherein each outer sleeve (180) includes a selector pin disposed on a leaf spring mounted on the outer sleeve (180), the selector pin engaging a selected one of the openings in the inner sleeve (182) to permit raising of the floor engaging base frame (12) relative to the floor.

58. The bed frame (10) of claim 57 wherein each inner sleeve (182) of each post (126) carries an adjustable pad leveler (226').

59. The bed frame (10) of claim 58 wherein each pad leveler (226') includes a threaded stem secured to an insert mounted to an end of each of the inner sleeves (182).

60. The bed frame (10) of claim 59 wherein each inner sleeve (182) of each post (126) carries an isolation pad assembly (190) to isolate the floor engaging base frame (12) from the floor.

61. The bed frame (10) of claim 60 wherein each isolation pad assembly (190) comprises a housing (198) forming a cavity, an elastomeric material (196) disposed in the cavity, a load bearing washer (194) coupled to the elastomeric material (196) and secured to the respective inner sleeve (182).

62. The bed frame (10) of claim 46 wherein the second linkage assembly (70) is connected between the lower leg frame section (48) and the carriage (30) such that when the thigh frame section (46) is tilted upwardly, the second linkage assembly (70) tilts the lower leg frame section (48) downwardly and such that when the thigh frame section (46) tilts downwardly, the second linkage assembly (70) tilts the lower leg frame section (48) to a horizontal position.

63. The bed frame (10) of claim 46 wherein the seat frame section (44) comprises a removable panel section (44a) to provide a platform for a longitudinal central portion of a mattress to be placed thereon, and wherein controls for the drive assemblies are mounted on the panel section (44a) for the seat frame section (44).

64. A bed frame (10) comprising:

- (a) a base frame (12) having a head end, a foot end, and opposite longitudinally extending sides (14, 16),
- (b) a carriage (30) mounted on the base frame (12) for longitudinal shifting of the carriage (30) relative to the base frame (12),
- (c) an articulating upper frame (40) comprising an upper body frame section (42), a seat frame section (44), a thigh frame section (46) and a lower leg frame section, the upper body, seat, thigh and lower leg frame sections (42-48) being longitudinally spaced apart and transversely extending and disposed to provide for articulating movement of at least the upper body, thigh and lower leg frame sections (42, 46 and 48), the seat frame section being mounted on the carriage (30) for motion therewith,
- (d) a first drive assembly (50), operatively connected between the carriage (30) and the base frame (12), for longitudinally shifting the carriage (30) relative to the base frame (12),

(e) a first linkage assembly (60) connected between the upper body frame section (42) and the base frame (12) such that longitudinal shifting of the carriage (30) relative to the base frame (12) results in tilting movement of the upper body frame section (42) with respect to the seat frame section (44), and

5 wherein the first drive assembly (50) is mounted on the carriage (30) to be connected to the base frame (12) upon assembly.

65. The bed frame (10) of claim 64 wherein the first linkage assembly (60) is mounted on the upper body frame section (42) to be connected to the base frame (12) during assembly.

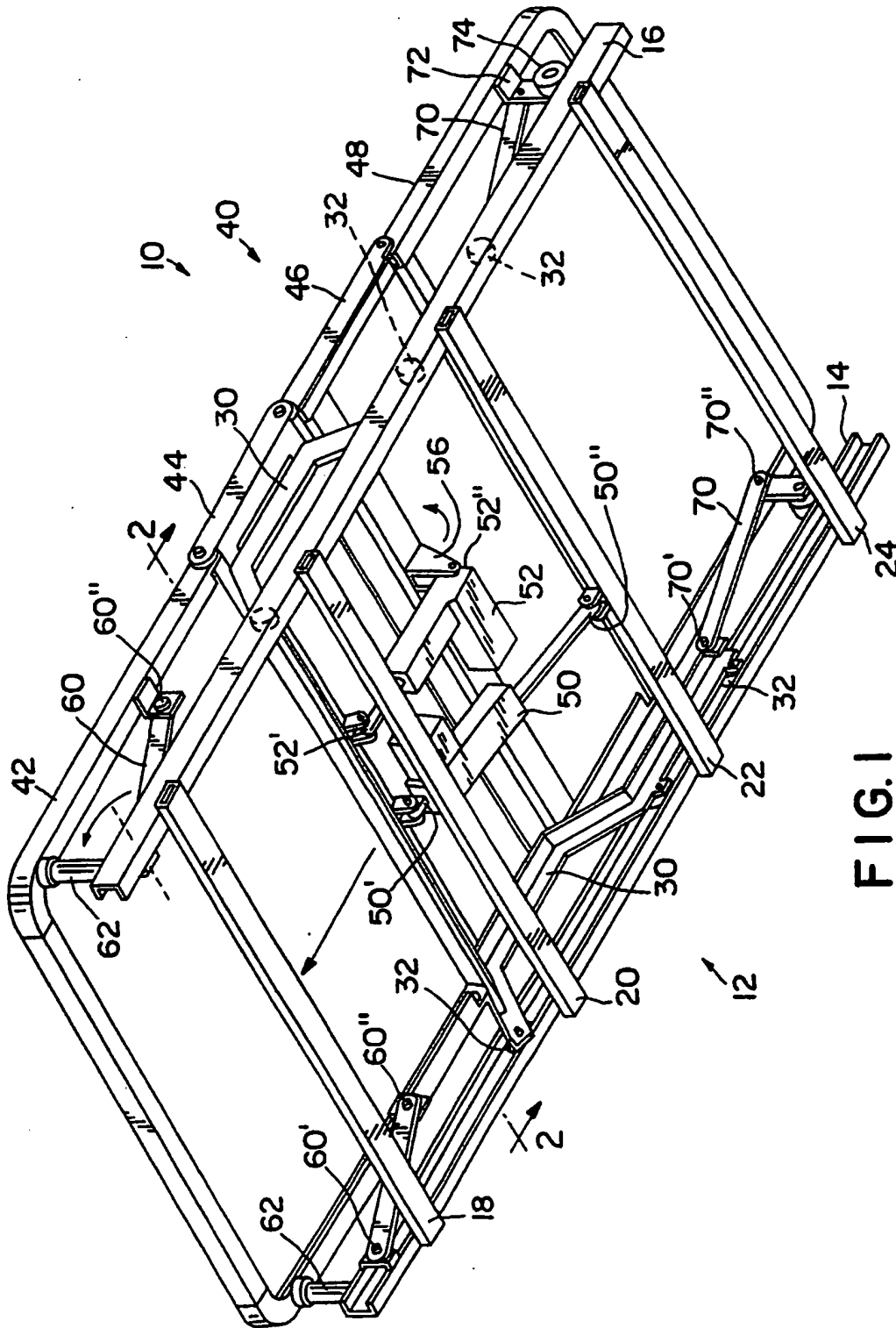
10 66. The bed frame (10) of claim 64 wherein the first drive assembly (50) includes a motor and a lead screw.

67. The bed frame (10) of claim 64 further including a second drive assembly (52) operatively connected between the carriage (30) and the thigh frame section (46) for raising and lowering the thigh frame section (46) relative to the carriage (30) and a second linkage assembly (70) connected between lower leg frame section (48) and the carriage (30) such that tilting movement of the thigh frame section (46) tilts the lower leg frame section (48) relative to the base frame (12), wherein the second drive assembly (52) is also mounted on the carriage (30) to be connected to the thigh frame section (46) during assembly.

20 68. The bed frame (10) of claim 67 wherein the second linkage assembly (70) is mounted on the lower leg frame section (48) to be connected to the carriage (30) during assembly.

69. The bed frame (10) of claim 64 wherein the second drive assembly (52) also includes a motor and a lead screw.

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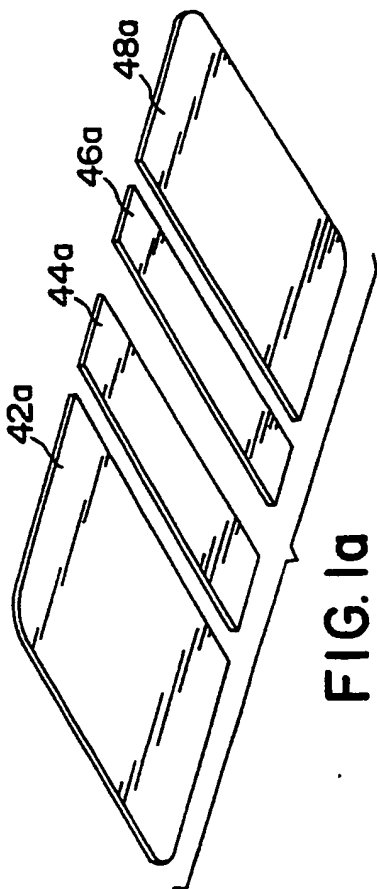


FIG. 1a

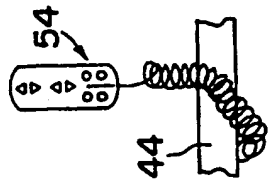


FIG. 1b

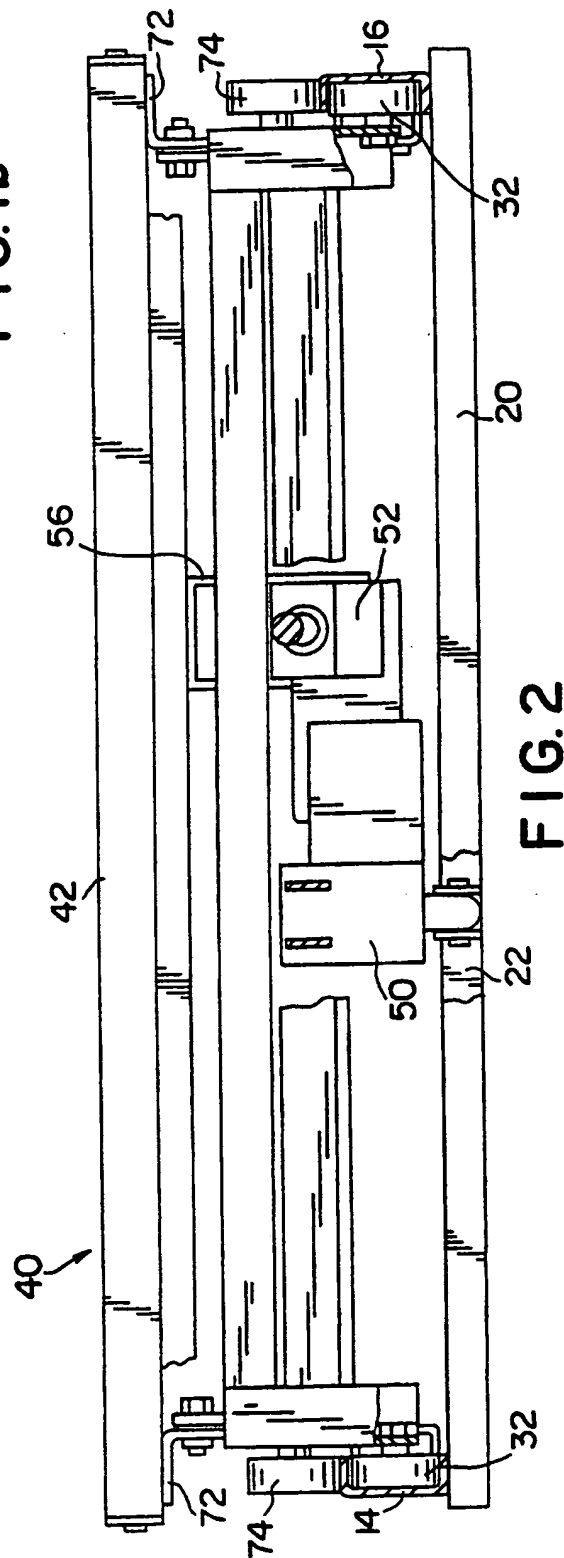


FIG. 2

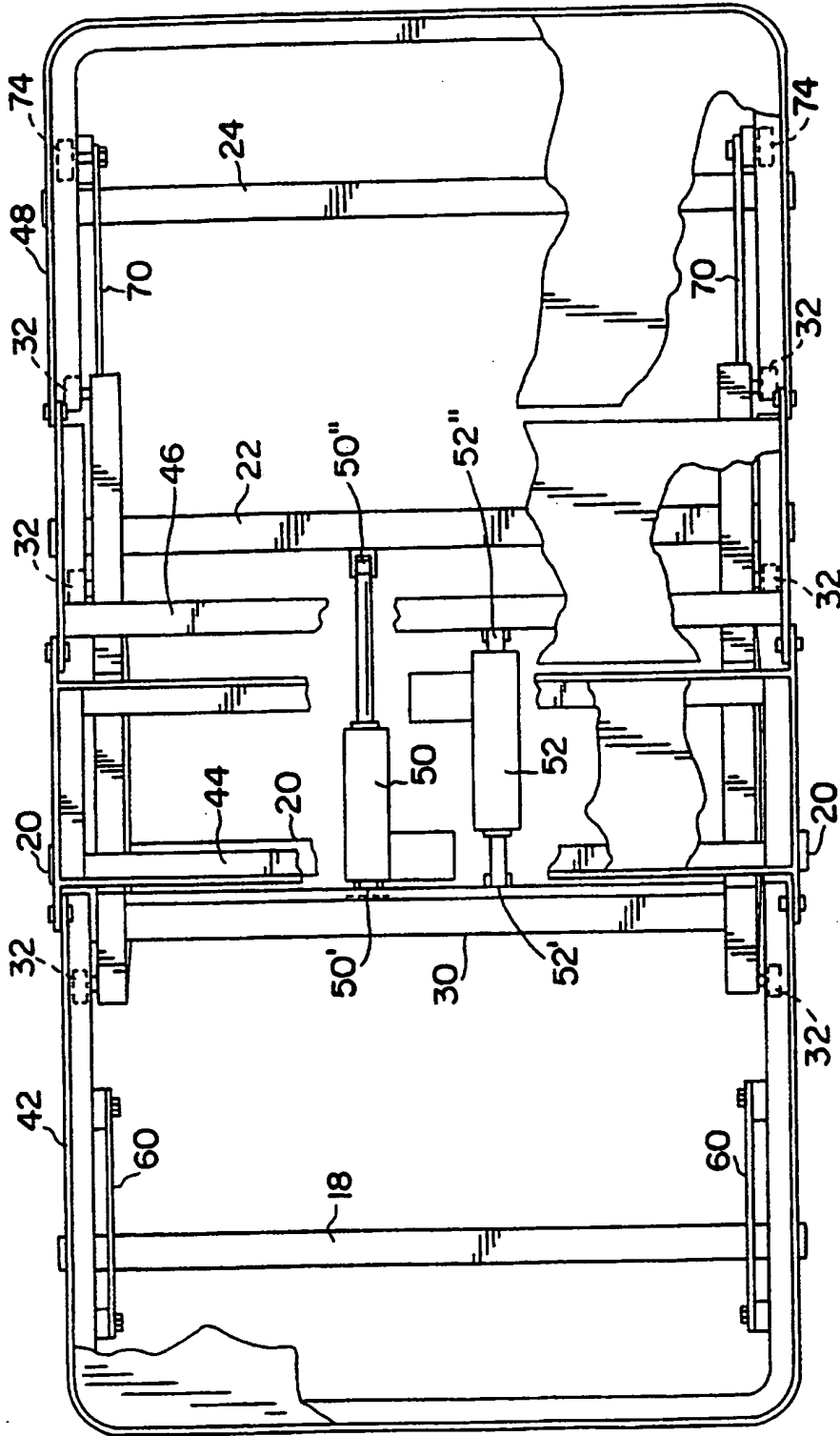


FIG. 3

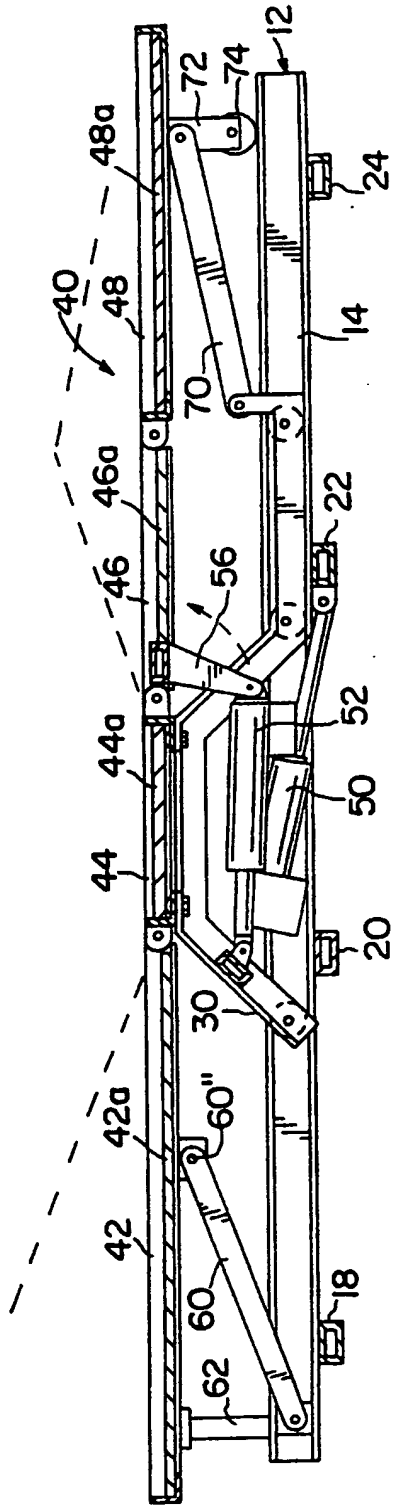


FIG. 4

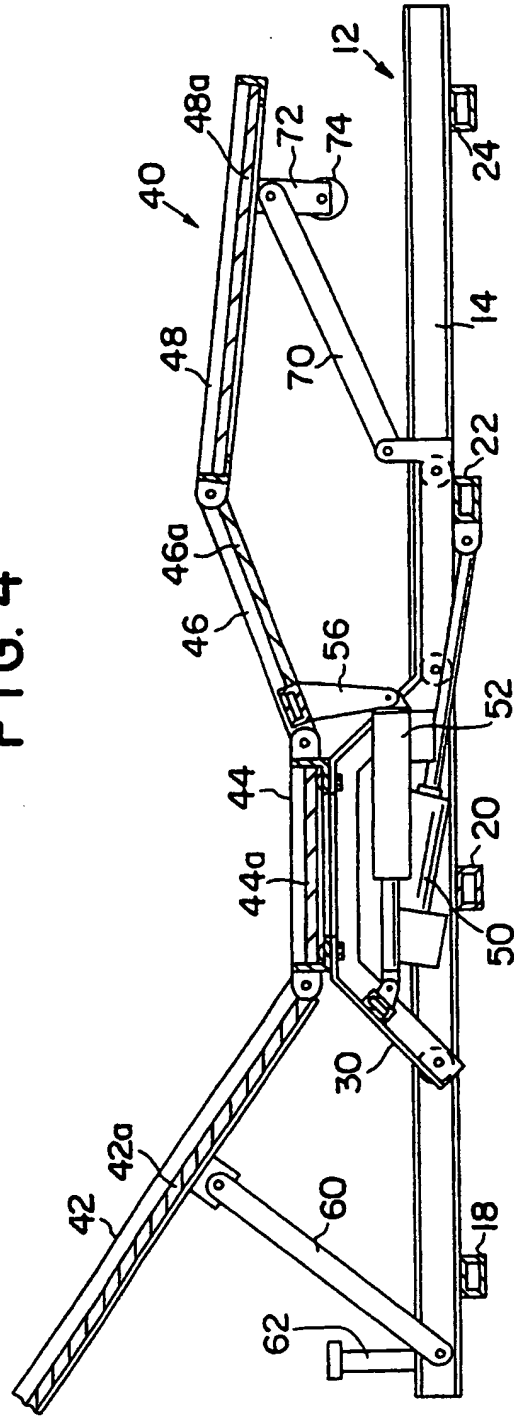


FIG. 5

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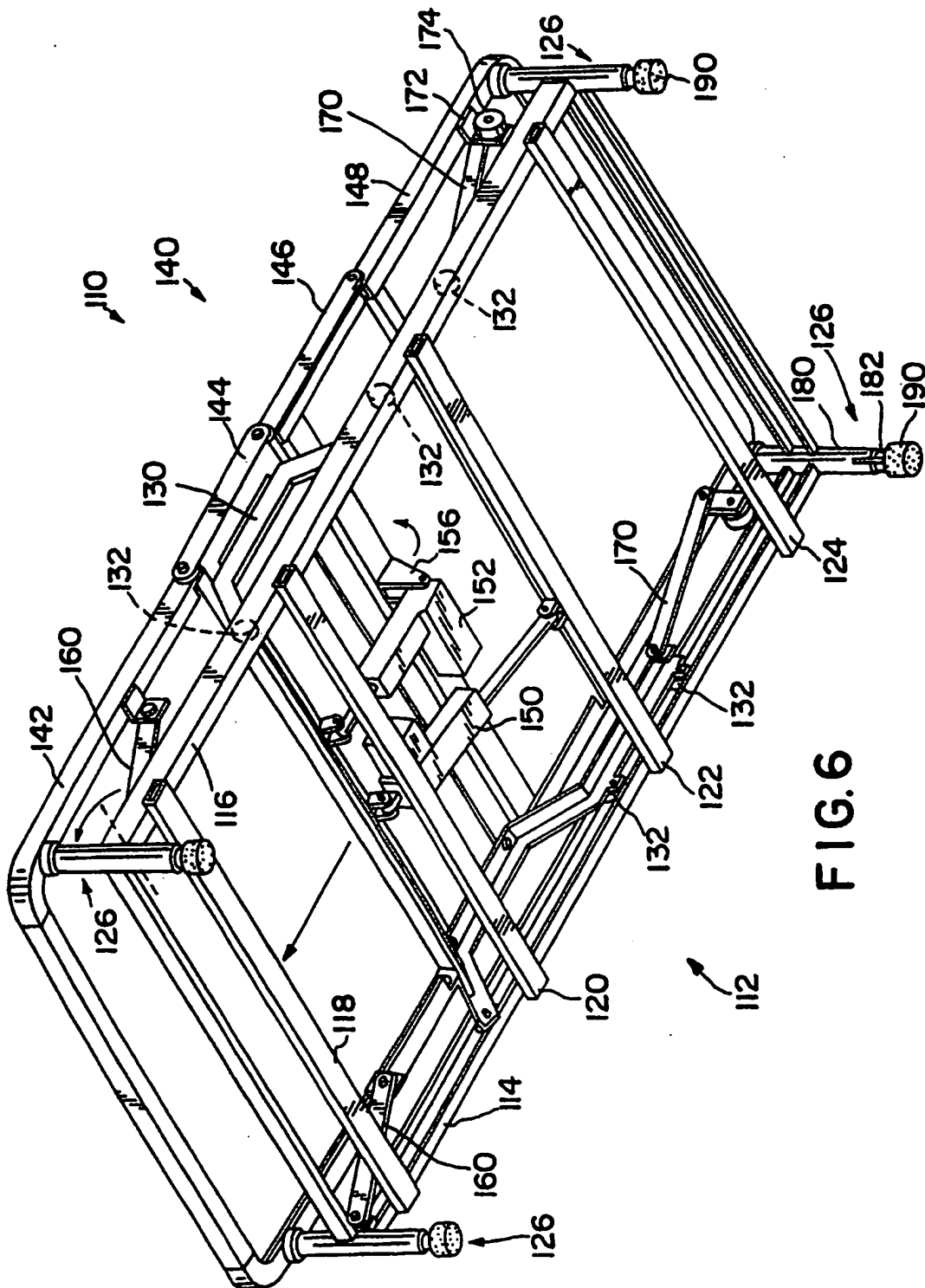


FIG. 6

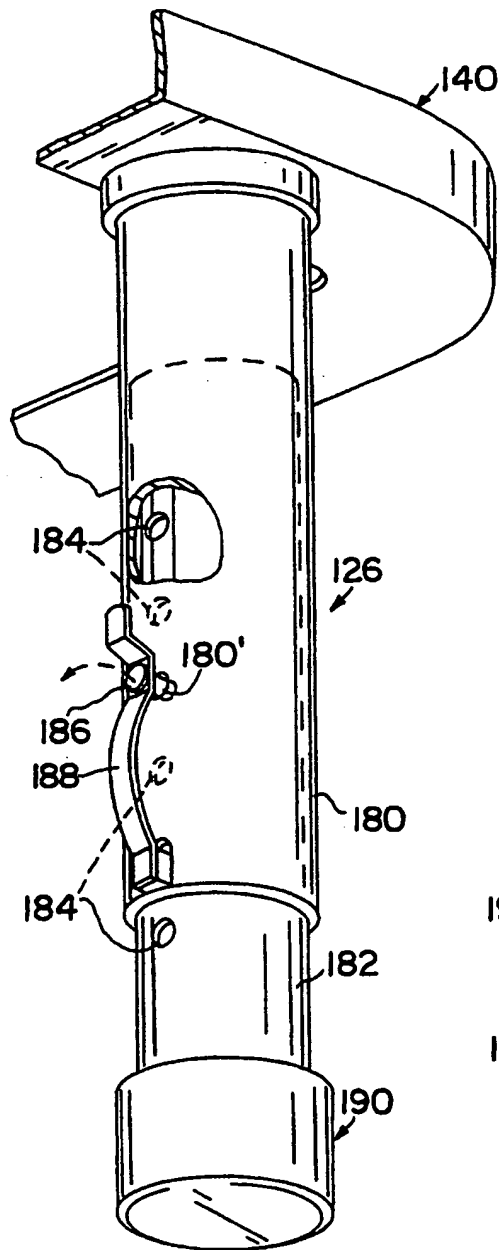


FIG. 7

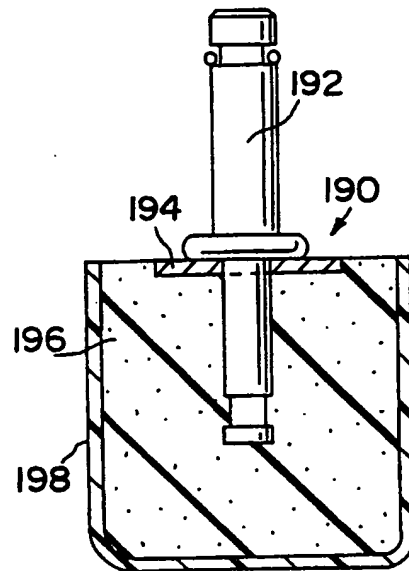


FIG. 7a

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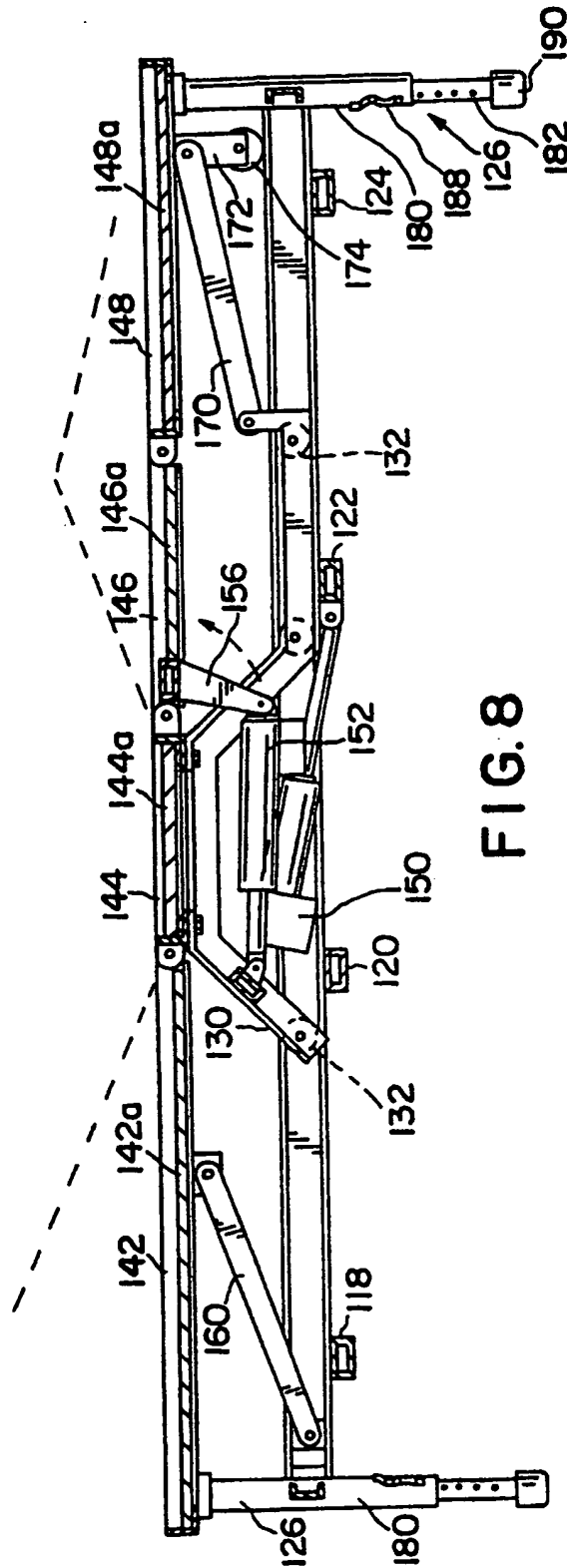


FIG. 8

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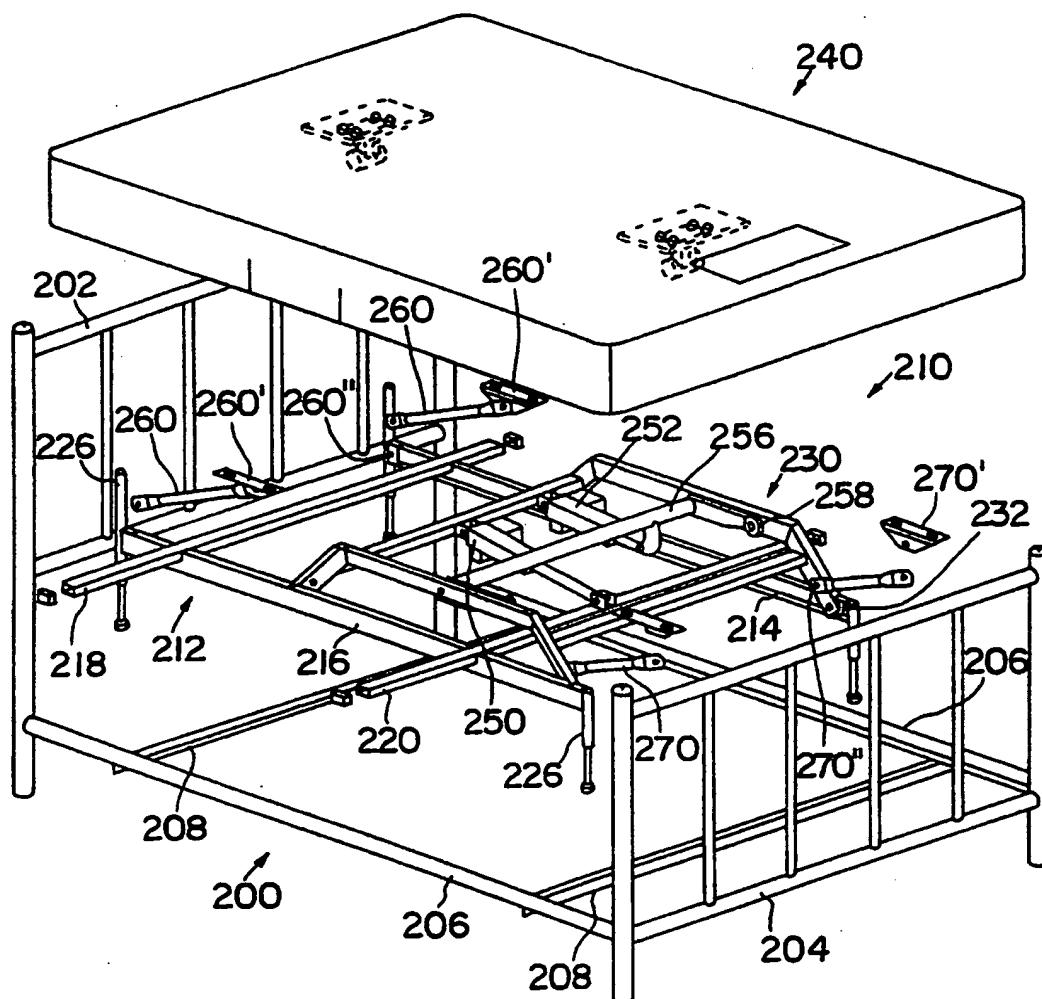


FIG. 9

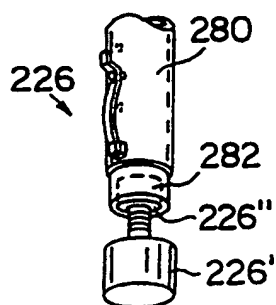


FIG. 9a

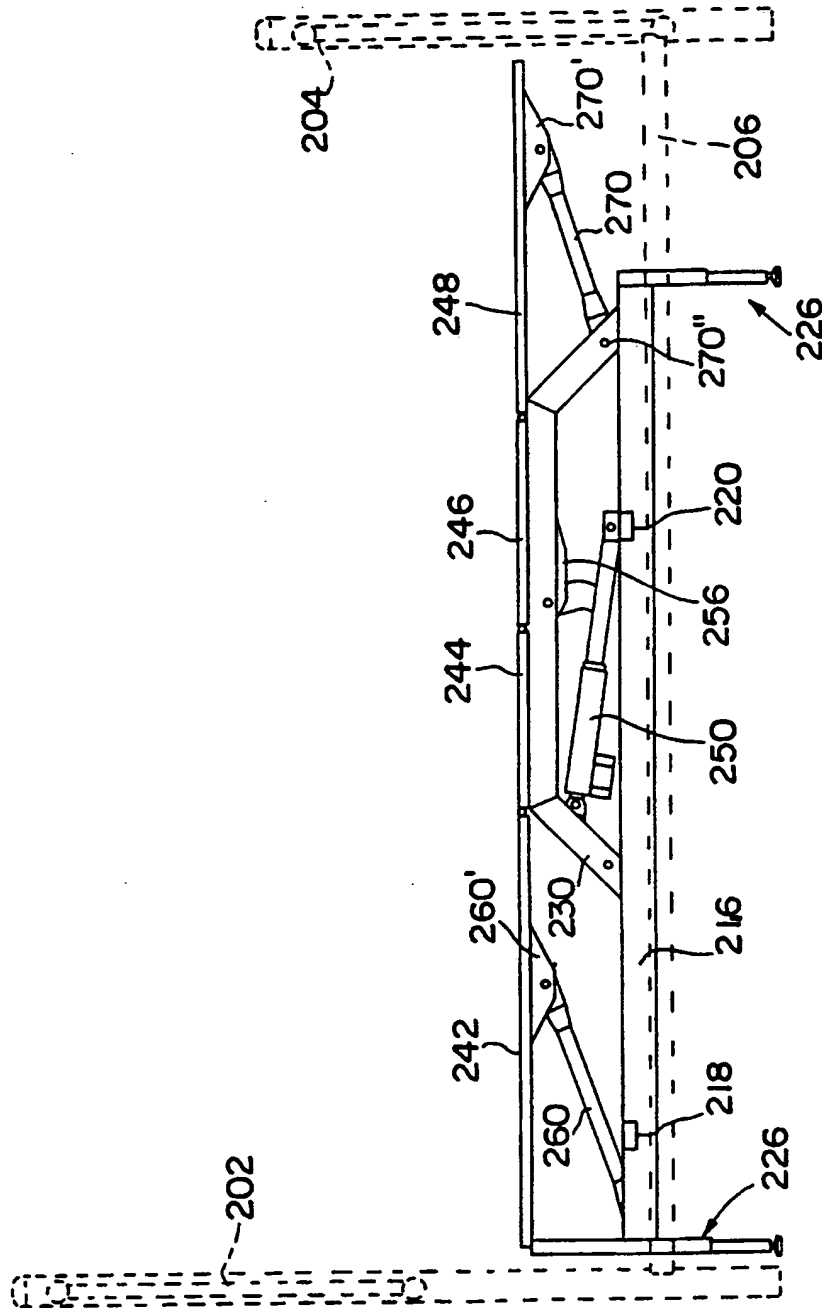


FIG. 10

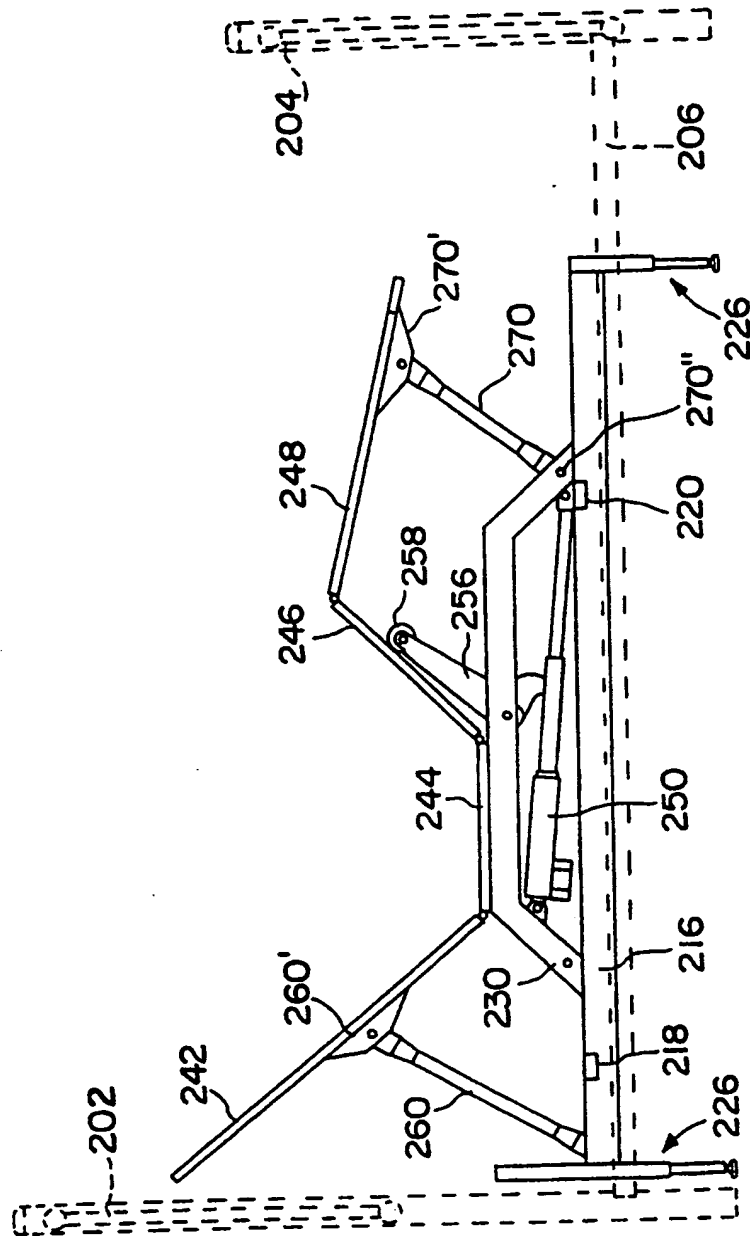


FIG. II

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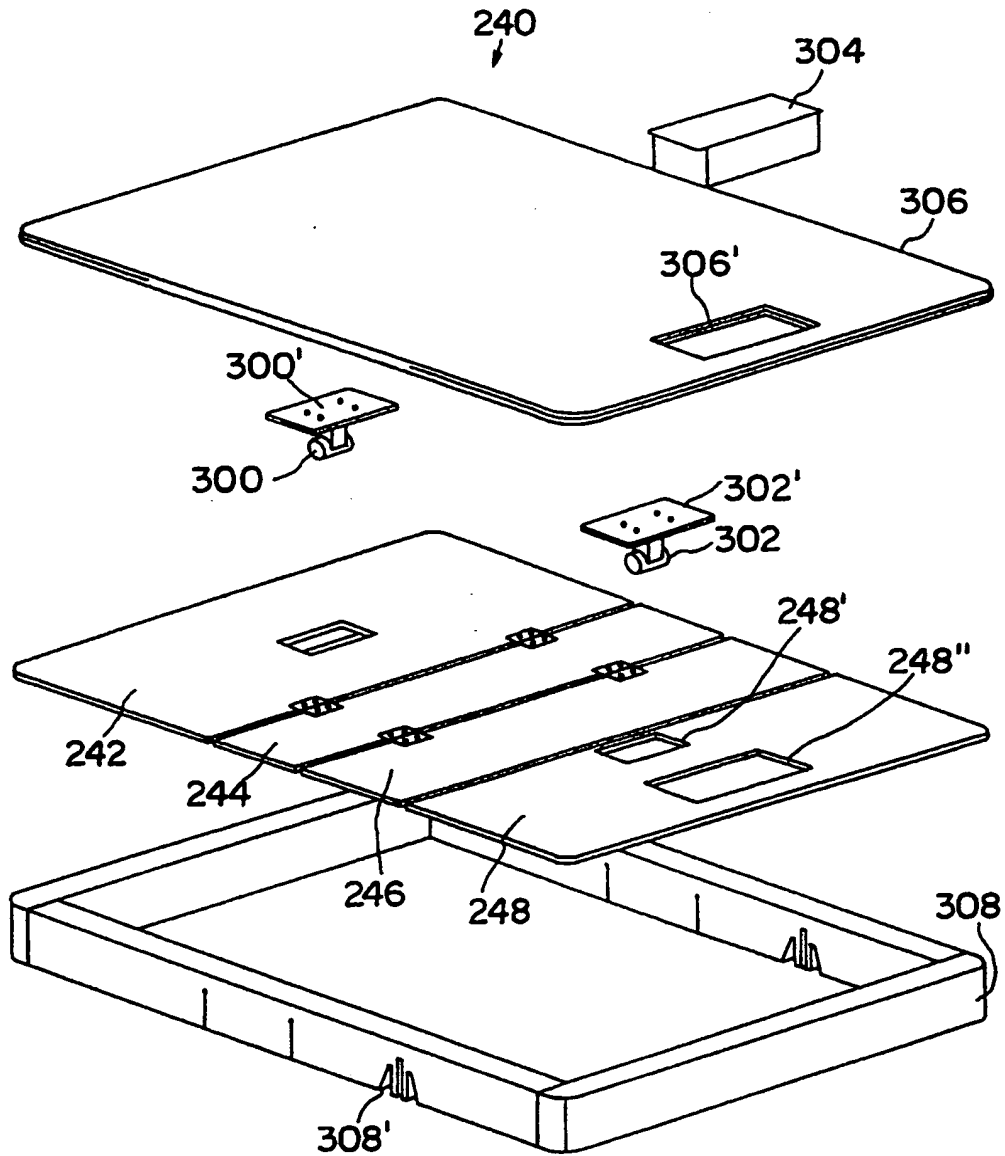


FIG. 12

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